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(54) Title: SYSTEM AND EQUIPMENT FOR IMAGE DISPLAY		
(57) Abstract <p>The invention is directed towards an arrangement for image display which is housed in a casing or box (1) provided with a display window (2) for display of images provided on a transparent large-size image strip (4) adjusted to the dimensions of said display window for direct view. The image strip (4) is arranged to be fed to and fro between two motor driven (5, 6) reels (7, 8), the transparent images being transilluminated by a lighting device (9, 11). The image strip feed is controlled by a microprocessor (14) connected to a memory (15). Normally the image display is arranged to follow a preprogrammed pattern controlled by the microprocessor (14). Operating keys (17) are arranged on the front side of the terminal box in order to allow manual operation of display sequences and image series via the microprocessor (14) in interaction with the viewer, so that the viewer can skim through, to and fro, the images on the image strip.</p>		

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SYSTEM AND EQUIPMENT FOR IMAGE DISPLAY

Technical Field and Prior Art

Nowadays it occurs that moving pictures are displayed in department stores, shops and shop-windows for advertising purposes, e.g. in the form of video tape recordings. Measurements of the value of various image systems with respect to attention and recollection have shown that consumers in general do not take the time to follow whole sequences of moving video based presentations, a fact that recent research has confirmed. That is to say that a consumer remembers better an advertising message or any other information presented in the form of a few simple still pictures in colour than if presented in sequences of moving pictures.

Problem of the Invention

The display of a series of pictures is mostly carried out on terms established by the displaying party, that is, those images which perhaps catches a viewer's interest and which he wishes to study several times and more closely cannot be controlled by him, so the result is that the viewer has to wait until the next display sequence starts. In the meantime his interest in the message may be lost. Also, by this process the advertisers will never know whether there is any interest at all in any of the products or messages presented in the images. A further problem in the display of images by light projection is the disturbing factor which surrounding light or daylight means to the viewer.

Summary of the Invention

The present invention aims at a solution to the above mentioned problem. The invention includes the display of bright, large size colour pictures of photographic sharpness, primarily for direct observation. Suitably the image display is performed in special so called terminal boxes, e.g. placed on the counter in a shop, in a shop window or hanging inside the glass pane of a shop door. Thanks to the size of the picture and the lighting arrangement the display will not be essentially disturbed by any bright surrounding light. The essential feature of the invention resides in the fact that the images, as stated, are of a large size and also transparent and that they are provided in a moveable image strip to be transilluminated by means of a light source. Furthermore, the image strip is to be controlled in such a way it can be fed forwards and backwards so that transillumination is carried out image by image to be directly observed through an opening, such as a window, in a wall, casing or the like, the image display being controlled e.g. by a microprocessor connected to operating keys. Said con-

trol is exercised in a synchronized relationship to the transillumination of each image by the light source during the time it is displayed, the operating keys then being associated to the microprocessor such that, either, automatic sequential display of all images of the image strip can be made or individual display image by image, giving the viewer the possibility to skim through, forwards and backwards, various images of the image strip.

By means of the system described above the images in an arrangement according to the invention can be shifted automatically or, by the microprocessor controlled drive system, in an interactive relationship with the viewer.

Furthermore, in one embodiment of the invention the viewer can obtain copies of the images concerned by the image strip being passed through a copying equipment.

In order to present a background of the problem concerning conditions of image brightness reference is made to a description present in transcript and being an excerpt from "Grundlagen der Farbmessung", edited by Karl Zeiss 1962, section 3.4 "Helligkeit/Din 5031".

The characterizing features of the invention are disclosed in the accompanying claims.

List of Figures

Fig. 1 is a diagrammatical and cross sectional side view of a terminal box designed in accordance with the invention.

Fig. 2 is likewise a cross sectional view of a further embodiment of a terminal box, including i.a. a copying equipment for the images concerned.

Fig. 3 illustrates how any of the terminal boxes according to Fig. 1 or 2 can be mounted in a specific display cabinet in order that the images concerned be projected onto a screen for providing large size images.

Description of embodiments

The arrangements shown in Fig. 1 comprises a boxlike cover forming a terminal box 1 provided with a display window 2, e.g. of size A3. The display window includes a glass pane 3 behind which a film strip 4, provided with images, is arranged to be advanced. The advance proper is carried out by means of a driving system comprising two motors 5, 6 structurally combined with two drive reels 7 and 8, respectively. The film strip is arranged to be wound about the reels to which the respective end of the film strip is secured. In association with the image window 2 a lighting box 9 is provided which includes a high power lamp 10, for example, in the form of one or more fluorescent tubes. The inside of the lighting box 9 is coated with

a high-reflecting material 11 and formed as a reflector throwing a strong light beam 12 towards the backside of the film to transmit light there-through. In order not to expose the film to burning injury a protective shield 13 of glass is provided in the lighting box close to the film 4. In the space between the pane 3 and the protective shield 13 the image film strip is adapted to be guided, in a manner not shown in detail, so as to be maintained in a flat condition. In the lower part of the terminal box a control system 14 is provided which includes a microcomputer or -processor having a memory unit 15. The control system is adapted to control the movements of both motors 5, 6 and thus also the movements of the drive reels 7, 8. A reader unit, e.g. a bar code reader 16, is connected to the microprocessor for cooperation with bar codes, not shown, appearing in the images. Operating keys 17 are also connected to the microprocessor for manual control.

In practice the device just described can be used in the following way:

The image film is delivered from some copying-studio and is wound, e.g. onto reel 7. Then the free end of the film strip 4 is pulled up through the space between the film shield 13 and the glass pane 3 mentioned above. The film strip is thereafter lead to the upper drive reel 8 and secured thereto by means of a clip device, not shown. During this loading of the film strip the control system is disconnected. The first image is now advanced from the lower drive reel 5 so as to enter said display window 2 after which the motors 5, 6 are reconnected to said control system 14-16.

Suitably the microprocessor 14 is preprogrammed in such a way that there is a certain display order of the images. To this end the film strip is unrolled, image by image, from the lower drive reel 7 to be received by the upper drive reel 8. The microprocessor 14 is controlling the drive and lighting systems in synchronism in such a way that the lighting means 10 is switched off each time there is a change of image. The display time for each image is preprogrammed, but in view of certain circumstances which, for example, depend on the contents of an image, the duration of this time can be extended or shortened. Certain images may request per se a longer display time than others. As mentioned above, each image is identified by a bar code appearing in the same and the reader 16 reads said code adjacent the image path in a position displaced in relation to the images. In this procedure the microprocessor 14 is able to trace which images request a longer or shorter displaying time.

As mentioned before operating keys 17 are connected to the microprocessor 14 so as to allow the image display to be controlled also manually. This

means that, in addition to the sequential preprogrammed display of the images occurring, also an interactive cooperation with the viewer can be brought about by actuating the said operating keys 17. Also, by a specific manipulating of the operating keys it is possible to create by means of the microprocessor another image sequence than the preprogrammed one. For instance, for a particular purpose only certain image combinations of the image strip can be shown, e.g. in order to answer a question by a viewer. In the memory 15 of the microprocessor 14 it can be stored how many times and how long each individual image has been studied under operation key control. In this way a measure is obtained of interest taken in certain images and their messages during display. This will be highly significant to the advertiser when he is to form his opinion about the value of the images he has ordered for introduction into the image strip.

As shown in Fig. 2 the device according to Fig. 1 can include, within the space of the terminal box 1 proper, a copying device for images on the film strip 4. As shown there is provided a copier 18 on top of the microprocessor unit 14, 15 proper, said copier also being adapted to be controlled by microprocessor 14. As can be seen in the figure the winding reel 7 and its motor 5 have been mounted near the rear side of the terminal box 1, a guide pulley 19 being mounted where reel 7 was located according to Fig. 1. Thus the film strip is now passed, as can be seen in the figure, from reel 7 through copier 18 about guide pulley 19 and past display window 2 up to reel 8. As in the device according to Fig. 1 the bar code reader 16 is located at the pulley 19, that is, on the same spot which reel 7 occupies in Fig. 1. A print chute 20 from the copier is provided, opening in the front of the terminal box 1 below the operating keys 17. Adjacent said operating keys 17 a credit card reader 21 is provided, here illustrated as a slot. In other respects the terminal box is identical with that shown in Fig. 1, also with regard to display window and image lighting apparatus. From the aspect of series production the advantages of such a construction would seem to be obvious.

An arrangement according to Fig. 2 is being used in the following way. A credit card is inserted into the credit card reader 21. By means of the operating keys 17 a particular image of the image strip 4 can be selected. When the viewer has focused the image in the display window 2 a copying key, not shown, can be pressed. Hereby the lighting device 10 is switched off and the microprocessor 14 controls the transport of image strip 4 in such a way that the image just appearing in display window 2 will land in the copying device 18. Reading image information in order to position correct-

ly in the copier 18 is also carried out by means of the bar code reader 16. By automatic control a print of the image concerned is now provided which is then fed out through delivery chute 20. In known manner the credit card is read by the credit card reader 21 and information obtained is supplied to microprocessor 14 which stores the information or transmits it by cable to a bank for making the transaction of record.

As a matter of course, instead of a credit card reader 21 coin slot means known per se could be provided in the terminal box for payment of prints received. However, to advertisers it is advantageous if the credit card owner can be identified and related to the images copies, for a possible later contact viewer-advertiser.

In an arrangement according to Fig. 2 it is advisable that means be provided for supplying copying paper to the copier, but this is not shown. Disregarding the copying function, in other respects both embodiments according to Figs. 1 and 2 have completely equivalent image display functions.

In larger department store rooms or e.g. air terminal halls it could be advisable to show the images enlarged. In order to bring about such a display the images concerned must be projected. To this end a display cabinet as shown in Fig. 3 can be provided, where the images are projected onto, or through, a large size viewing screen. The arrangement shown in Fig. 3 comprises a display cabinet 22 wherein a terminal box as that in Fig. 2 is provided. In front of the display window 2 proper a positive lens 23, e.g. a Fresnel lens, is arranged to cooperate with projection optics 24 illustrated in the form of a lens. The projection optics 24 projects the image towards a mirror 25 which is adjustable as indicated by the dashed arrow 26. The mirror 25 reflects the light beam towards a viewing screen 27 mounted on the inside of the sloping top wall 28. As indicated by the dashed arrow 29 also the screen 27 is adjustable in order to bring about adjustment of the image in relation to the cabinet opening 30 through which the viewer can look at the image projected onto screen 27. In order to bring about an interactive cooperation with the viewer concerned it is necessary, when mounting in a display cabinet, to provide on the front side thereof a key set 17', equivalent to and cooperating with the operating keys 17, and also credit card reader 21'.

This arrangement is used in complete agreement with the disclosure with reference to Fig. 2, that is, copying of images can be carried out also in the embodiment according to Fig. 3.

In order to bring about image brightness it is of course necessary, in the simplest case, to provide very strong light sources 10 for transil-

luminating the film strip 4. However, light sources can be contemplated which are of such a nature that they emit invisible light for cooperation with converting means, e.g. for frequency shift, or with reagent reflexion means for radiation into the very image strip in order to create a high light intensity, for example, by means of laser light. Essential to all embodiments is the feature that it should be possible to look at the images in ambient light without any appreciable inconvenience and without the brightness being essentially effected. As a matter of course also such solutions may be conceived where the light source is a laser which emits white light, by prismatic dispersion divided into three RGB-beams forming the base of the colour image display. Use of microsize semiconductor lasers also represents a solution where the beams concerned can be transformed into visible light by a frequency displacement in or near the IR region.

In certain cases it could be appropriate to let the microprocessor 14 control a sound producing device synchronised with the image display in order to provide comments on or explanations of the images, so that the viewer will receive sound as well as image information. This is not illustrated in the drawings, but suitably the microprocessor 14 is connected to a sensor which senses the presence of a person in order to initiate image display and sound playback in connection with the person appearing.

In certain designs the drive motors 5, 6 of the reels 7, 8 could suitably be step motors controlled by the microprocessor 14 for digital operation of the feeding movement.

CLAIMS

1. An arrangement for electronic control, in interactive cooperation with a viewer, of image display for information, advertising and similar purposes, characterized in that the images are of large size and transparent, that they are provided in a moveable image strip (4) to be transilluminated by means of a light source (10), that the image strip (4) is controlled so as to be fed to and fro so that transillumination (12) is carried out image by image for direct viewing through an opening, such as a window (2) in a wall, casing (1) or the like, that the image display is controlled e.g. by a microprocessor (14) associated with operating keys (17), that control is exercised in a synchronized relationship with the transillumination of each image by the light source (10) during the time of display, and that operating keys (17) are in such a switching relationship to the microprocessor (14) that either an automatic sequential display of all the images of the image strip can be brought about or an individual display, image by image, with the viewer's option to skim through, to and fro, various images in the image strip.
2. An arrangement according to claim 1, characterized in that the image strip (4) is provided with an identification marking related to each image, preferably in the form of a bar code which is scanned by a reader (16) connected to the microprocessor (14).
3. An arrangement according to claim 1 or 2, characterized in that the microprocessor (14) coacts with a readable memory unit (15) for recording automatically the number of times and the duration of the time a certain image is shown in the window (2).

4. An arrangement in accordance with any of the preceding claims, characterized in that the microprocessor (14) controls a sound reproducing device synchronised with the image display.
5. An arrangement according to claim 4, characterized in that the microprocessor (14) is connected to a sensor, which senses the presence of a person in order to initiate image display and sound playback in connection therewith.
6. An arrangement according to any of the preceding claims, characterized in that the image strip is arranged to run between two driving means e.g. in the form of reels (7, 8), which are connected to each its motor (5 and 6, respectively) and controlled in such a way that they keep the image strip (4) tensioned along the display window (2) while feeding it.
7. A device according to claim 6, characterized in that the drive motors (5, 6) of said reels (7, 8) are step motors connected to the microprocessor (14) for digital control of the feeding movements.
8. An arrangement according to claim 7, characterized in that the image strip (4) is arranged to pass through a copying device (18) located between the drive means (7 and 8) whereby the viewer can order a print of a selected image by means of the operating keys (17).
9. A device according to claim 8, characterized in that the copying function is related, by means of the microprocessor (14), to a scanning operation of e.g. credit card information (21) for debiting the print, possibly also registering the card owner.

10. An arrangement according to any of the preceding claims, characterized in that the arrangement is housed in a casing or box (1), enclosing the complete arrangement and including a window (2) as said, the image strip then passing between two transparent plates (3 and 13) whereof the inner plate is made of heat insulating material to protect the image strip (4) against heat radiation of the light source (10), the transillumination of the image strip being such that the light intensity of the image is not essentially effected by the level of light prevailing outside the display window (2).

11. An arrangement according to any of the preceding claims, characterized in that the device housed in the casing (1) is located in a particular display cabinet (22) where the image shown in the display window (2) is projected by means of a lens system onto a large size screen (27) positioned on the rear top wall (28) of the display cabinet (22), said lens system comprising a Fresnel lens (23), an image lens (24) and a mirror system (25) having a high reflective mirror glass, and that the display cabinet (22) is provided with an opening (30) in the front top wall of a size corresponding to that of the screen, whereby the viewer can study the enlarged image on the screen (27) within the display cabinet (22) and operate display and copying by means of keys (17'), possibly also by means of credit card readers, said keys and readers being mounted on the front side of the display cabinet (22) and connected to corresponding operating-reading-output means (17, 20) on the internal device (1) located inside the display cabinet.

12. An arrangement according to claim 11, characterized in that the image transillumination is arranged in such a way that one or more light sources (10) emit invisible light for cooperation with converting means, e.g. for frequency displacement, or with reagent-reflection means for radiation into the image strip proper in order to provide a higher light intensity, e.g.

by means of laser light.

13. An arrangement according to any of the preceding claims, characterized in that the light source consists of a laser emitting white light which is divided, by prismatic dispersion, into three RGB beams forming the base of colour image display.

14. An arrangement according to any of the preceding claims, characterized in that the light source consists of a large number of microsize semiconductor lasers whose light can be converted into visible light by frequency displacement in or near the IR region.

15. An arrangement according to any of the preceding claims, characterized in that the image strip (4) is adapted to carry hologram reproductions in order that a three-dimensional image display be brought about.

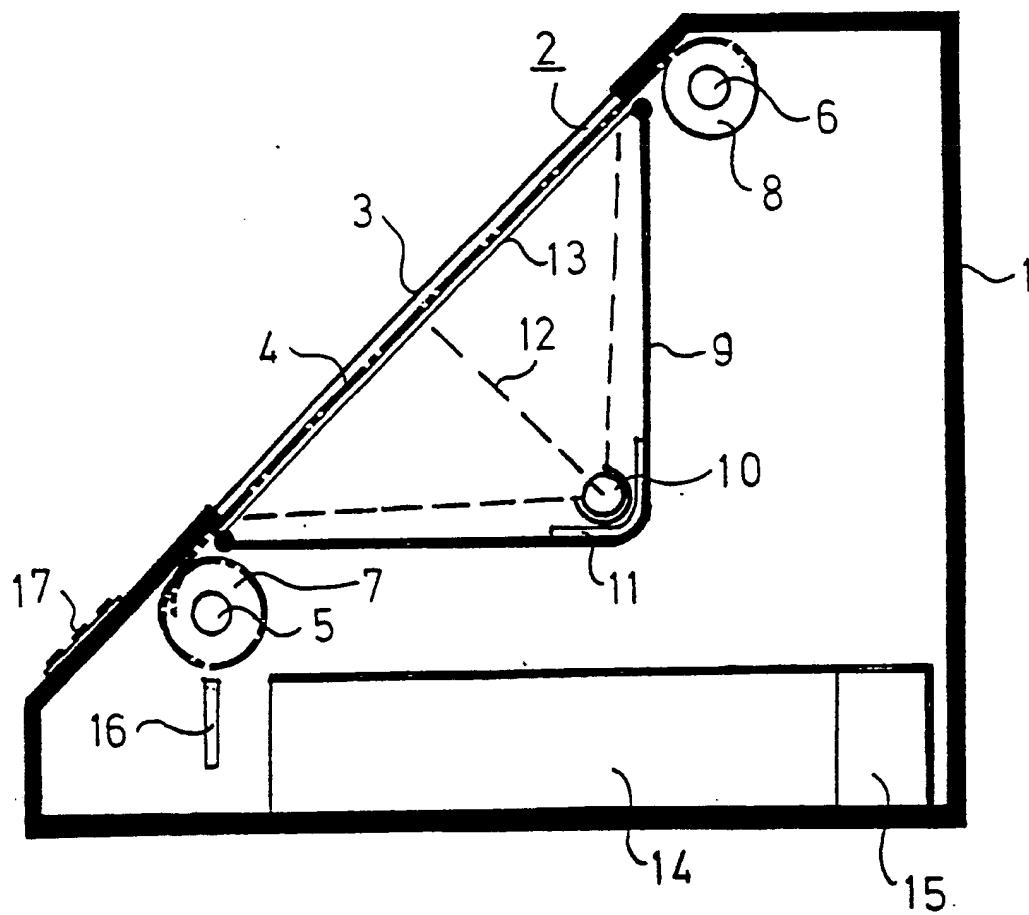
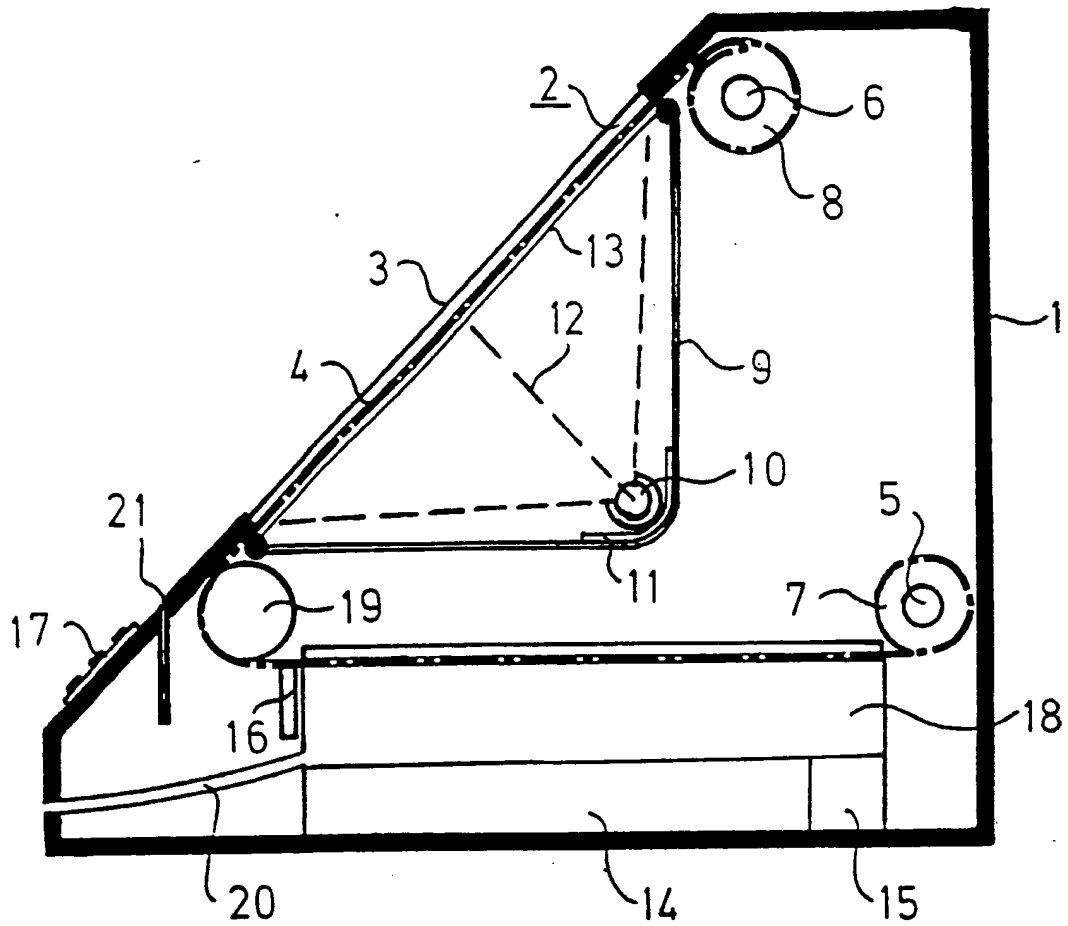
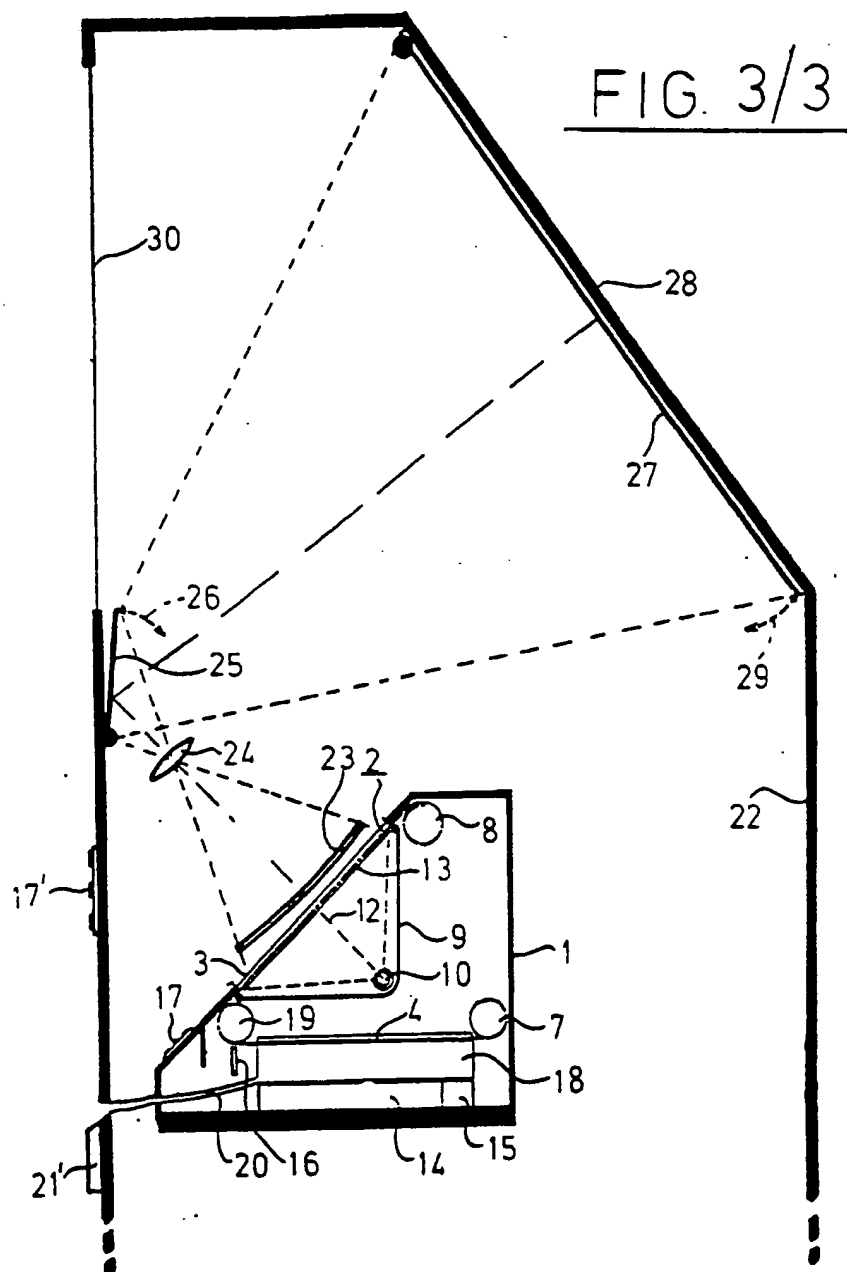
FIG. 1/3

FIG. 2/3



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 89/00569

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC4: G 03 B 23/12		
II. FIELDS SEARCHED		
Minimum Documentation Searched *		
Classification System :	Classification Symbols	
IPC4	G 03 B	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
SE,DK,FI,NO classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT *		
Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages **	Relevant to Claim No. **
A	US, A, 3290987 (C.L. JAMES ET AL) 13 December 1966, see the whole document --	1-15
A	WO, A1, 89/02096 (OHLSON CARL-ERIC) 9 March 1989, see the whole document --	1-15
A	US, A, 4452518 (DI GIANFILIPPO ET AL) 5 June 1984, see the whole document --	1-15
A	US, A, 4351591 (STOCKETT) 28 September 1982, see the whole document -- -----	1-15
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: **</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search 2nd January 1990		Date of Mailing of this International Search Report 1990 -01- 11
International Searching Authority SWEDISH PATENT OFFICE		Signature of Authorized Officer Björn Kallstenius <i>[Signature]</i>

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/SE 89/00569**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3290987	13/12/66	NONE	
WO-A1- 89/02096	09/03/89	NONE	
US-A- 4452518	05/06/84	GB-A-B- 2112964	27/07/83
		DE-A- 3248538	18/08/83
		GB-A-B- 2161623	15/01/86
		GB-A-B- 2162968	12/02/86
US-A- 4351591	28/09/82	NONE	